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10/713,479	11/14/2003	Timothy Z. Liu	ABIOS.035A	1204

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KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER	
CROW, ROBERT THOMAS	

ART UNIT	PAPER NUMBER
1634	

DATE MAILED: 05/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/713,479	LIU ET AL.	
	Examiner	Art Unit	
	Robert T. Crow	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) *19-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18 and 36-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 May 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group I in the reply filed on 8 May 2006 is acknowledged. Claims 19-35 are withdrawn. Claims 1-18 and 36-45 are currently under prosecution.

Information Disclosure Statement

The Information Disclosure Statement filed 18 February 2004 is acknowledged. However, Document EP 0 340 605 A2 is not being considered because no English translation has been provided.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1. Claims 1-18 are indefinite in the claim 1, which recites the limitation "a non-covalent photoelectrochemical label for contacting with the nucleic acid probe" in lines 5-6 of claim 1. It is unclear how the label defines a structural limitation of the system.

2. Claims 13 and 14 are indefinite in claim 13, which recites the limitation "a sacrificial reductant" in line one of claim 13. It is unclear how the reductant defines a structural limitation of the system.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 6-10, and 13-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Hashimoto et al (U.S. Patent No. 5,776,672, issued 7 July 1998).

Regarding claim 1, Hashimoto et al teach a system for detecting a target nucleic acid comprising: a support comprising an electrode and a nucleic acid probe attached thereto, wherein the nucleic acid probe comprises a sequence complementary to the target nucleic acid sequence (Abstract); a non-covalent photoelectrochemical label for contacting with the nucleic acid (e.g., an intercalator that generates an optical electrode

response; column 4, lines 5-17); a light source for irradiating the nucleic acid probe (luciferin and H_2O_2, which generate luminescence from luminol to excite ethidium bromide that is bound to the hybridized probe; column 20, line 40-53), and a data collection controller for measuring a current at the electrode (e.g., a potentiostat and a computer; column 11, lines 39-44).

Regarding claim 2, Hashimoto et al teach the system of claim 1, wherein the nucleic acid probe comprises a DNA sequence (e.g., Example 1, column 14).

Regarding claim 4, Hashimoto et al teach the system of claim 1, wherein the target nucleic acid sequence comprises a DNA sequence (e.g., Example 1, column 14).

Regarding claim 6, Hashimoto et al teach the system of claim 1, wherein the support comprises an array of nucleic acid probe elements (e.g., Figure 10).

Regarding claim 7, Hashimoto et al teach the system of claim 6, wherein the array comprises greater than about 10 of nucleic acid probe elements (e.g., Figure 10).

Regarding claim 8, Hashimoto et al teach the system of claim 1, wherein the electrode comprises gold (column 8, lines 43-55).

Regarding claim 9, Hashimoto et al teach the system of claim 1, wherein the noncovalent photoelectrochemical label is a compound comprising a ruthenium and 1,10-phenanthroline derivative (e.g., a tris (phenanthroline) ruthenium salt; column 4, lines 24-26).

Regarding claim 10, Hashimoto et al teach the system of claim 1, wherein the noncovalent photoelectrochemical label comprises $[Ru(bipy)_3]^{2+}$ (e.g., tris (bipyridyl) ruthenium salt; column 4, line 30).

Regarding claims 13 and 14, the system of claim 1 is discussed above. Hashimoto et al also teach the carrier is coated with coated with a salt of a tertiary amine (e.g., distearylaminedimethylammonium chloride; column 11, lines 14-19).

It is noted that *In re Best* (195 USPQ 430) and *In re Fitzgerald* (205 USPQ 594) discuss the support of rejections wherein the prior art discloses subject matter which there is reason to believe inherently includes functions that are newly cited or is identical to a product instantly claimed. In such a situation the burden is shifted to the applicants to "prove that subject matter shown to be in the prior art does not posses characteristic relied on" (205 USPQ 594, second column, first full paragraph). Because Hashimoto et al teach the system comprising a salt of a tertiary amine (e.g., distearylaminedimethylammonium chloride; column 11, lines 14-19), Hashimoto et al anticipate the system of claim 1 further comprising a sacrificial reductant (i.e., claim 13), wherein the sacrificial reductant is a salt of a tertiary amine (i.e., claim 14).

Regarding claim 15, Hashimoto et al teach the system of claim 1, further comprising an optical scanner for scanning the support (e.g., the base plate used for immobilization is itself a signal detectable optical fiber; Figure 6 and column 26, lines 61-67).

Regarding claim 16, Hashimoto et al teach the system of claim 1, further comprising a fluid handling system for the support (e.g., Figure 1, wherein the system comprises fluid washing vessel 8; column 27, lines 55-60).

Regarding claim 17, Hashimoto et al teach the system of claim 1, further comprising a temperature control system for the support (e.g., Figure 1, wherein the system comprises temperature controller 3; column 27, lines 50-55).

2. Claim 12 is rejected under 35 U.S.C. 102(b) as being anticipated by Hashimoto et al (U.S. Patent No. 5,776,672, issued 7 July 1998) as defined by White et al (J. Am. Chem. Soc., vol. 86, pp. 941-942 (1964)).

Regarding claim 12 the system of claim 1 is discussed above. Hashimoto et al teach the light source is luminol (column 20, line 40-53). White et al define the emission of light by luminol as being visible (e.g., between 350 and 600 nm; Figure 1).

3. Claims 36, 37, and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Stanley et al (U.S. Patent No. 5,824,477, issued 20 October 1998).

Regarding claim 36, Stanley et al teach a kit for detecting a target nucleic acid sequence comprising: a support comprising an electrode (e.g., a kit comprising electrodes and at least one primer [i.e., probe]; column 8, line 65- column 9, line 4) and a nucleic acid probe attached thereto (e.g., a probe is immobilized on the electrode; column 4, lines 6-8), wherein the nucleic acid probe comprises a sequence

complementary to the target strand (Abstract); and a non-covalent photoelectrochemical label (e.g., there are multiple probes [column 8, lines 18-19], wherein a probe is labeled with a chemiluminescent label [column 6, lines 18-25], and the kit has labeled probes column 8, lines 59-64).

Regarding claim 37, Stanley et al teach the kit of claim 36 wherein the nucleic acid probe comprises DNA (e.g., the nucleic acid is immobilized on the electrode [column 4, lines 4-12], wherein the nucleic acid is DNA; column 3, lines 56-61).

Regarding claim 40, Stanley et al teach the kit of claim 36 wherein the electrode is gold (column 5, lines 18-20).

4. Claims 36-37 and 41-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Wohlstadter et al (U.S. Patent No. 6,207,369 B1, issued 27 March 2001).

Regarding claim 36, Wohlstadter et al teach a kit for detecting a target nucleic acid comprising: a support comprising an electrode (e.g., a kit having particles immobilized on electrodes [column 60, lines 1-12], wherein the particles comprise beads with immobilized binding agents [column 59, lines 29-40], wherein the binding agents are nucleic acids; column 5, lines 35-40), and a non-covalent photoelectrochemical label (e.g., the beads are fluorescent; column 94, lines 54-56).

Regarding claim 37, Wohlstadter et al teach the kit of claim 36, wherein the probe comprises DNA (e.g., DNA strands are absorbed on gold electrodes; column 5, lines 14-17).

Regarding claim 40, Wohlstadter et al teach the kit of claim 36, wherein the electrode is gold (column 31, lines 35-40).

Regarding claim 41 and 42, Wohlstadter et al teach the kit of claim 36, wherein the label is $[Ru(bipy)_3]^{2+}$ (column 4, lines 39-52).

Regarding claims 43 and 44, Wohlstadter et al teach the kit of claim 36, wherein a sacrificial reductant is provided (e.g., tripropylamine is advantageously provided; column 4, lines 60-62).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al (U.S. Patent No. 5,776,672, issued 7 July 1998) in view of Gillespie et al (U.S. Patent No. 5,482,834, issued 9 January 1996).

Regarding claims 3 and 5, Hashimoto et al teach the system for detecting a target nucleic acid of claim 1 comprising: a support comprising an electrode and a nucleic acid probe attached thereto, wherein the nucleic acid probe comprises a sequence complementary to the target nucleic acid sequence (Abstract); a non-covalent photoelectrochemical label for contacting with the nucleic acid (e.g., an intercalator that generates an optical electrode response; column 4, lines 5-17); a light source for irradiating the nucleic acid probe (luciferin and H_2O_2, which generate luminescence from luminol to excite ethidium bromide that is bound to the hybridized probe; column 20, line 40-53), and a data collection controller for measuring a current at the electrode (e.g., a potentiostat and a computer; column 11, lines 39-44). While Hashimoto et al teach the device uses nucleic acid probes and targets (Abstract), Hashimoto is silent with respect to RNA.

However, Gillespie teaches immobilization of RNA on solid supports (column 3, lines 5-7) as well as using RNA targets (column 12, lines 23-25) with the added

advantage that RNA hybridizations allow measurement of variations in expression of genes (column 22, lines 17-24).

It would therefore have been obvious to a person or ordinary skill in the art at the time the invention was claimed to have modified the immobilized nucleic acid systems of Hashimoto et al with RNA as taught by Gillespie et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in allowing measurement of variations in expression of genes as explicitly taught by Gillespie (column 22, lines 17-24).

3. Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al (U.S. Patent No. 5,776,672, issued 7 July 1998) in view of Dabiri et al (U.S. Patent No. 5,871,628, issued 16 February 1999).

Regarding claim 11, the system of claim 1 is discussed above. Hashimoto et al are silent with respect to lasers.

However, Dabiri et al teach a system for detecting nucleic acids in an array (e.g., a system for DNA sequencing using a capillary array; Abstract) comprising electrodes (column 3, lines 65-67) and an argon laser light source with the added advantage that the laser provides frequencies compatible with a wide variety of fluorescent dyes (column 7, lines 30-36).

It would therefore have been obvious to a person or ordinary skill in the art at the time the invention was claimed to have modified the system of Hashimoto et al with a laser as taught by Dabiri et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in providing frequencies compatible with a wide variety of fluorescent dyes as explicitly taught by Dabiri et al (column 7, lines 30-36).

4. Claims 1 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al (U.S. Patent No. 5,776,672, issued 7 July 1998) in view of Noblett (U.S. Patent No. 6,362,004 B1, issued 26 March 2002).

Regarding claim 18, the system of claim 1 is discussed above. Hashimoto et al are silent with respect to machine-readable identifying indicia.

However, Noblett et al teach the use of microarrays comprising immobilized nucleic acids (column 1, lines 20-30) having machine readable identifying indicia (e.g., fiducials [Abstract], wherein the fiducials are scanned by a positioning system; column 6, lines 41-48) with the added advantage of allowing positioning and alignment of the substrate for spot analysis and comparison procedures (Abstract).

It would therefore have been obvious to a person or ordinary skill in the art at the time the invention was claimed to have modified the system of Hashimoto et al with the machine readable identifying indicia as taught by Noblett et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such

a modification because said modification would have resulted in allowing positioning and alignment of the substrate for spot analysis and comparison procedures as explicitly taught by Noblett et al (Abstract).

5. Claims 36-37, and 39-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al (U.S. Patent No. 5,776,672, issued 7 July 1998) in view of Wohlstadter et al (U.S. Patent No. 6,207,369 B1, issued 27 March 2001).

Regarding claim 36, Hashimoto et al teach a support comprising an electrode and a nucleic acid probe attached thereto, wherein the nucleic acid probe comprises a sequence complementary to the target nucleic acid sequence (Abstract); a non-covalent photoelectrochemical label (e.g., an intercalator that generates an optical electrode response; column 4, lines 5-17). Hashimoto et al are silent with respect to kits.

However, Wohlstadter et al teach a kit for detecting a target nucleic acid comprising: a support comprising an electrode (e.g., a kit having particles immobilized on electrodes [column 60, lines 1-12], wherein the particles comprise immobilized binding agents [column 59, lines 2933], wherein the binding agents are nucleic acids; column 5, lines 35-40) with the added advantage that the kits achieve assay results in short time periods (column 7, lines 45-55).

It would therefore have been obvious to a person having ordinary skill in that art at the time the invention was made to modify the support and label of Hashimoto et al into a kit format as taught by Wohlstadter et al with a reasonable expectation of success.

The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in assay results in short time periods as explicitly taught by Wohlstadter (column 7, lines 45-55).

Regarding claim 37, the kit of claim 36 is discussed above. Hashimoto et al also teach the nucleic acid probe comprises a DNA sequence (e.g., Example 1, column 14).

Regarding claim 39, the kit of claim 36 is discussed above. Hashimoto et al also teach the support comprises an array of nucleic acid probe elements (e.g., Figure 10).

Regarding claim 40, the kit of claim 36 is discussed above. Hashimoto et al also teach the electrode comprises gold (column 8, lines 43-55).

Regarding claim 41, the kit of claim 36 is discussed above. Hashimoto et al also teach the noncovalent photoelectrochemical label is a compound comprising a ruthenium and 1,10-phenanthroline derivative (e.g., a tris (phenanthroline) ruthenium salt; column 4, lines 24-26).

Regarding claim 42, the kit of claim 41 is discussed above. Hashimoto et al also teach the noncovalent photoelectrochemical label comprises $[Ru(bipy)_3]^{2+}$ (e.g., tris (bipyridyl) ruthenium salt; column 4, line 30).

Regarding claims 43 and 44, the kit of claim 36 is discussed above. Hashimoto et al also teach the carrier is coated with coated with a salt of a tertiary amine (e.g., distearylaminedimethylammonium chloride; column 11, lines 14-19). As noted above, because Hashimoto et al teach a salt of a tertiary amine (e.g., distearylaminedimethyl-ammonium chloride; column 11, lines 14-19), Hashimoto et al teach a sacrificial

reductant (i.e., claim 43), wherein the sacrificial reductant is a salt of a tertiary amine (i.e., claim 44).

6. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al (U.S. Patent No. 5,776,672, issued 7 July 1998) and Wohlstadter et al (U.S. Patent No. 6,207,369 B1, issued 27 March 2001).as applied to claim 36 above, and further in view of Gillespie et al (U.S. Patent No. 5,482,834, issued 9 January 1996).

Regarding claim 38, the kit of claim 36 is discussed above. Neither Hashimoto not the Wohlstadter et al teach RNA probes.

However, Gillespie teaches immobilization of RNA on solid supports (column 3, lines 5-7) with the added advantage that RNA hybridizations allow measurement of variations in expression of genes (column 22, lines 17-24).

It would therefore have been obvious to a person or ordinary skill in the art at the time the invention was claimed to have modified the immobilized nucleic acid kits of Hashimoto et al and Wohlstadter et al with the RNA probes as taught by Gillespie et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in allowing measurement of variations in expression of genes as explicitly taught by Gillespie (column 22, lines 17-24).

7. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Hashimoto et al (U.S. Patent No. 5,776,672, issued 7 July 1998) and Wohlstadter et al (U.S. Patent No. 6,207,369 B1, issued 27 March 2001).as applied to claim 36 above, and further in view of Noblett (U.S. Patent No. 6,362,004 B1, issued 26 March 2002).

Regarding claim 45, the kit of claim 36 is discussed above. Hashimoto et al and Wohlstadter et al are silent with respect to machine-readable identifying indicia.

However, Noblett et al teach the use of microarrays comprising immobilized nucleic acids (column 1, lines 20-30) having machine readable identifying indicia (e.g., fiducials [Abstract], wherein the fiducials are scanned by a positioning system; column 6, lines 41-48) with the added advantage of allowing positioning and alignment of the substrate for spot analysis and comparison procedures (Abstract).

It would therefore have been obvious to a person or ordinary skill in the art at the time the invention was claimed to have modified the kit of Hashimoto et al and Wohlstadter et al with the machine readable identifying indicia as taught by Noblett et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in allowing positioning and alignment of the substrate for spot analysis and comparison procedures as explicitly taught by Noblett et al (Abstract).

Conclusion

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert T. Crow whose telephone number is (571) 272-1113. The examiner can normally be reached on Monday through Friday from 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Robert T. Crow
Examiner
Art Unit 1634

5/25/06

BJ FORMAN, PH.D.
PRIMARY EXAMINER